

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S) Jean-Michel Reynes et al GROUP ART UNIT: 2814
APPLN. NO.: 10/518,158 EXAMINER: John C. Ingham
FILED: December 10, 2004
TITLE: POWER SEMICONDUCTOR DEVICE AND METHOD OF
 MANUFACTURING THE SAME

Certificate of Submission

I hereby certify that this correspondence is being submitted to the
U.S.P.T.O., Alexandria, VA.

- ☐ Addressed per C.F.R. § 1.1(a) and deposited with the United
States Postal Service with sufficient postage as first class mail.
☐ Facsimile transmitted in accordance with C.F.R. § 1.6(d).
☒ Submitted electronically via EFS in accordance with "Legal
Framework for EFS Web".

May 24, 2007

Date of Submission

/Stacie Herrera/

Signature

Stacie Herrera

Printed Name of Person Signing Certificate

STATEMENT OF REASONS FOR PRE-APPEAL BRIEF REVIEW

HONORABLE COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, VA 22313-1450

SIR:

Responsive to the Office Action dated January 24th 2007, made Final, and the Examiner's
comments of May 8th 2007 with regard thereto, Applicants herewith submit a Pre-Appeal Brief
Request for Review and an accompanying statement.

AMENDMENT

Paragraph 2 of the Office Action of January 24, 2007, objected to claim 11 because of the following informality: the claim depends from claim 0. This objection was not addressed in the Amendment filed April 19 2007. It is requested that an examiner's amendment be entered to make claim 11 depend from claim 10.

STATEMENT

Claims 6-7, 10-11 and 15-16 will be discussed herein.

The prior art discussed below is Neilson (US Patent No. 5,399,892), Knoch (US Patent No. 5,703,389) and Tsoi (US Patent No. 5,631,484).

All of Applicants' arguments from the Amendment dated April 19 2007 are still valid and apply.

Claim 10

Claim 10 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Neilson in view of Tsoi and/or of Knoch. The Examiner's comments of May 8th 2007 refer to the teaching of Tsoi.

The language of claim 10 expressly states:

forming said single and substantially uniformly doped base region comprises the steps of:

using said patterned insulated gate region in forming a plurality of base region branches extending radially towards at least one base region branch of an adjacent cell to present juxtaposed base region ends,

subsequently merging together the base region branches of adjacent cells adjacent and between said juxtaposed base region ends to form said single and substantially uniformly doped base region.

Referring to the Office Action dated January 24th 2007, paragraph 6, the Examiner admits that Neilson does not disclose the process step of subsequently merging together the base region branches of adjacent cells adjacent and between said juxtaposed base region ends to form said single and substantially uniformly doped base region as set forth by Claim 10. The Office Action of January 24th 2007 asserts that it would have been obvious to use the teachings of Tsoi to produce self-aligned base and source regions with a reduced number of masking steps. Whether

or not this assertion is true, it is respectfully submitted that none of Neilson, Knoch nor Tsoi teach subsequently merging together the base region branches of adjacent cells adjacent and between said juxtaposed base region ends to form said single and substantially uniformly doped base region.

In the Examiner's comments of May 8th 2007, the Examiner states that "the Tsoi reference teaches patterning insulated gate regions to form a plurality of implanted base region branches with juxtaposed ends then diffusing the branches. As seen in the reference Fig 1, the branches (19) are merged together to form a single and substantially uniform doped base region."

Figs 3 and 4 of Tsoi show the process steps in more detail. As described in col 3 lines 23 to 25, Fig 3 shows substrate 26 after a dielectric layer or interlayer dielectric 37 is formed over polycrystalline gate layer 34. As described col 3 lines 39 to 52, a protective photomask layer 42 is formed over dielectric layer 37, exposed portions of dielectric layer 37 and polycrystalline gate layer 34 are etched to provide formed openings 143 and 144 shown in Fig 4, which shows insulated gate regions 122 and 222 separated by dumb bell portion 18 and stripe portion 19. As described in col 3 lines 58 to 63, next, doped base regions 47 are formed extending into substrate 26 (using ion implantation) and are self-aligned to insulated gate portions 122 and 222.

As described col 4 lines 7 to 11, the structure shown in Fig 4 is provided after implantation by diffusion and annealing. Doped base regions 47 are clearly shown separated, are not merged and do not form a single and substantially uniformly doped base region as set forth by Claim 10. The plan view of Fig 1 that the Examiner refers to shows stripes 11 to 17, including dumb bell portions 18 and stripe portions 19, that are produced by the photomask and etch steps shown in Figs 3 and 4, not by merging juxtaposed edges or ends of the base regions. Never does Tsoi refer to merging base portions of adjacent cells. If the equivalents of 'adjacent cells' in Tsoi are the stripes 11 to 17, dumbbell and stripe portions 18 and 19 could perhaps be described as juxtaposed but, as seen in Fig 4 and subsequent Figs always remain 'juxtaposed', that is to say separated, and never merge.

Analogous comments apply to Knoch, who does not teach merging merging base portions of adjacent cells either.

As described in the present application on page 12, "The merge of the PHV regions at high temperature creates the contact between all PHV" (*base*) "regions of all branches so as to form the matrix of merged PHV regions having rounded shape or octagon shape with unequal side lengths. By having merged well or PHV regions, the phenomenon of parasitic NPN or PNP bipolarity (also called snap back effect) is avoided since the base region will always be polarised, which is a major improvement. Thus, the breakdown voltage is improved as well as the

Unclamped Inductive Switching (UIS) such that the voltage and the current circulating between the individual cells can be sustained at a higher level.” The formation of merged wells giving these advantages is not obtained by the processes described by Neilson, Knoch or Tsoi or any combination of their teachings.

Accordingly, it is submitted that the distinctions cited above between the teachings of the cited art and claim 10 are not obvious, and therefore Claim 10 is allowable.

The dependent claims are believed to be allowable for at least the same reasons given for the independent claim. In addition, it is submitted that these claims each specify specific inventive features.

Accordingly, it is submitted that all the claims are allowable and issue of a patent on the application is solicited.

Applicants believe the application is in condition for allowance which action is respectfully solicited. Please contact me if there are any issues regarding this communication or the current Application.

If Applicant has overlooked any additional fees, or if any overpayment has been made, the Commissioner is hereby authorized to credit or debit Deposit Account 503079.

SEND CORRESPONDENCE TO:

Freescale Semiconductor, Inc.
Law Department

Customer Number: 23125

Respectfully submitted,

By: 

David G. Dolezal
Attorney of Record
Reg. No.: 41,711
Telephone: (512) 996-6839
Fax No.: (512) 996-6854